Streaming Nooksack
Real Time Water Sensor Monitoring Pilot

Steven Potokar
Region 10/OCE

Fran Kremer
ORD/NRMRL

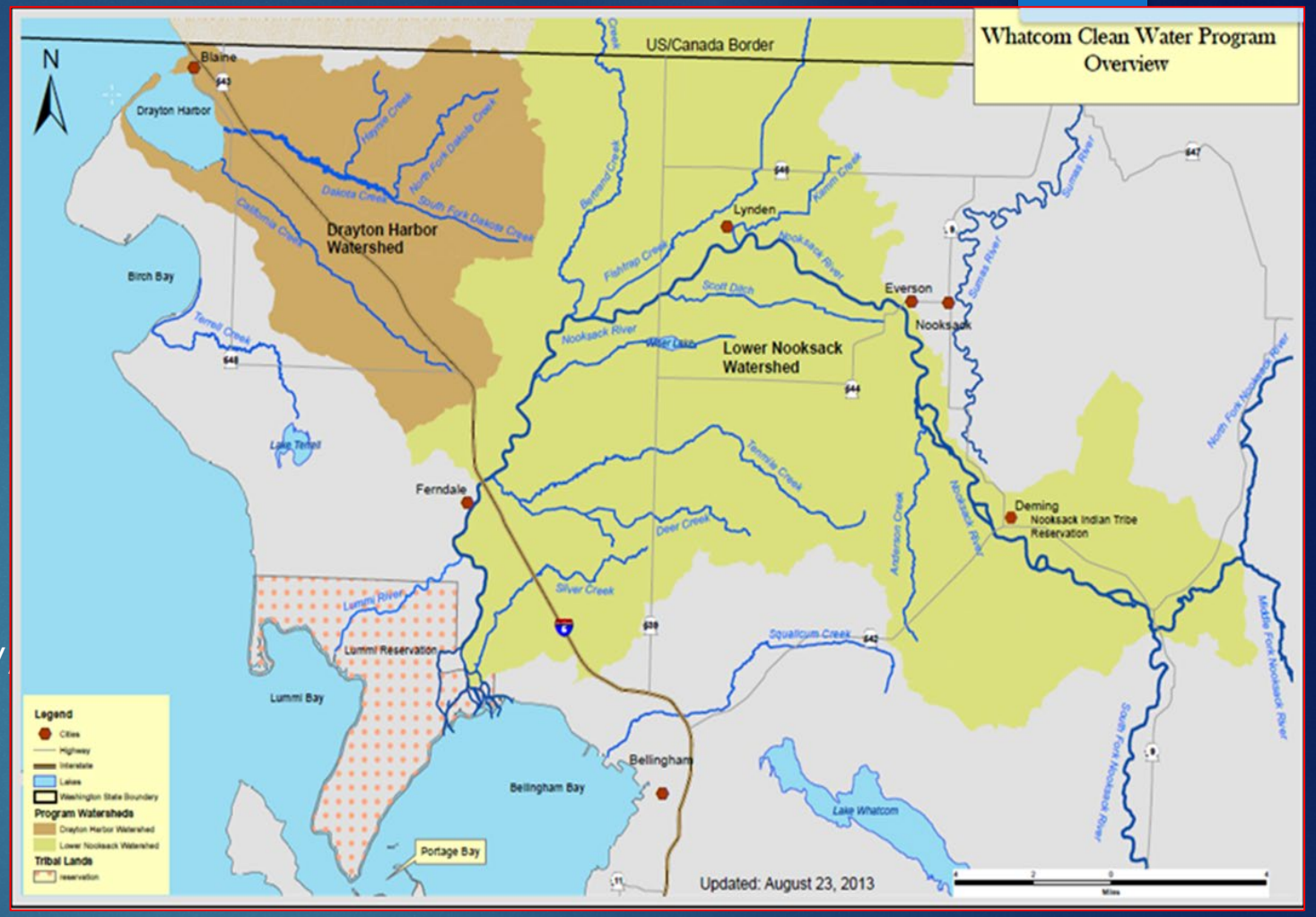
Streaming Nooksack Collaborators

USEPA
- Region 10
- ORD
- OW/ OWOW, OST
- OECA/OC
- OEI

Lummi Nation
Washington State Department of Ecology
Washington State Department of Agriculture
Whatcom Conservation District
ZAPS Technologies, LLC

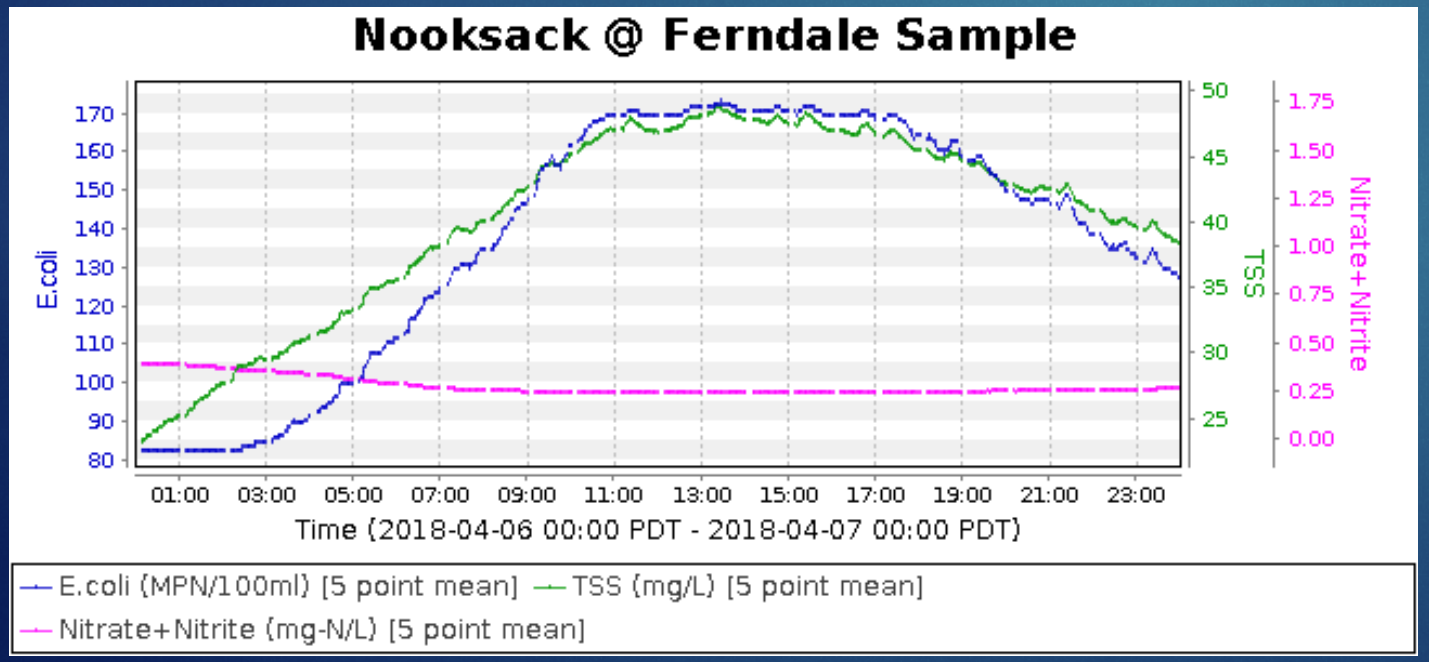
Background

- Non-Point Source Pollution in Nooksack River Watershed (Whatcom County and Canada)
- Closure of Tribal, Commercial, and Recreational Shellfish Beds
  - Fecal Bacteria, E. coli, Nutrients
- Heavy Agricultural Area with Cross-Boundary Contribution
  - Dairies, Heifer Replacement, Poultry, Beef Grazing
  - Produces 85% of US Raspberries

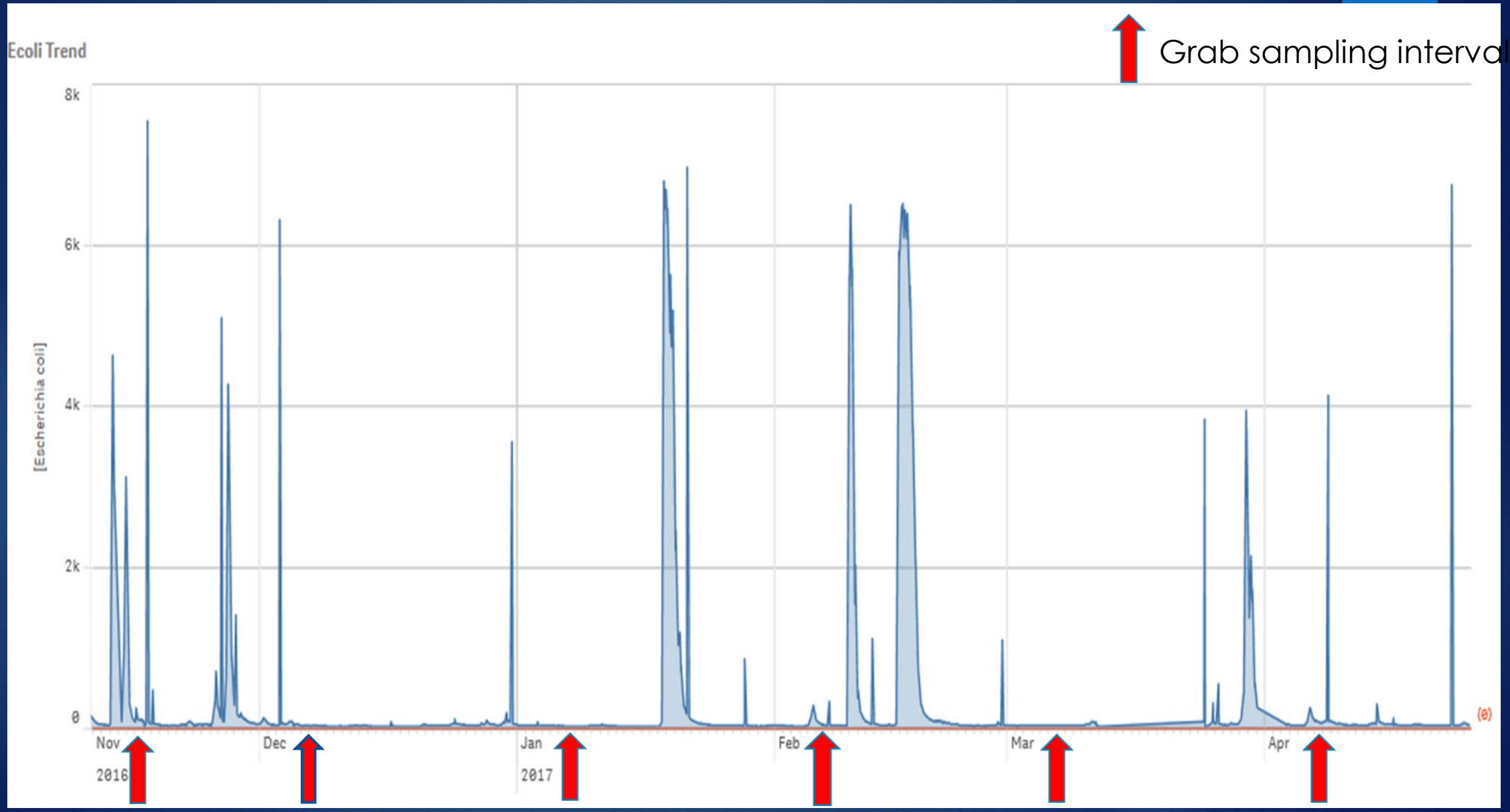


Technology

- ZAPs LiquID Monitoring Station
  - E. coli, TSS, Nutrients, BOD, Hydrocarbons
  - Real-time Web Updates
- Cooperative Research And Development Agreement (CRADA)
  - 5 units deployed in watershed
  - 1 unit for pilot studies



Real Time Monitoring vs Grab Samples



Sending/Storing and Analyzing/Visualizing Data

Interoperable Watersheds Network (IWN) Enhancement

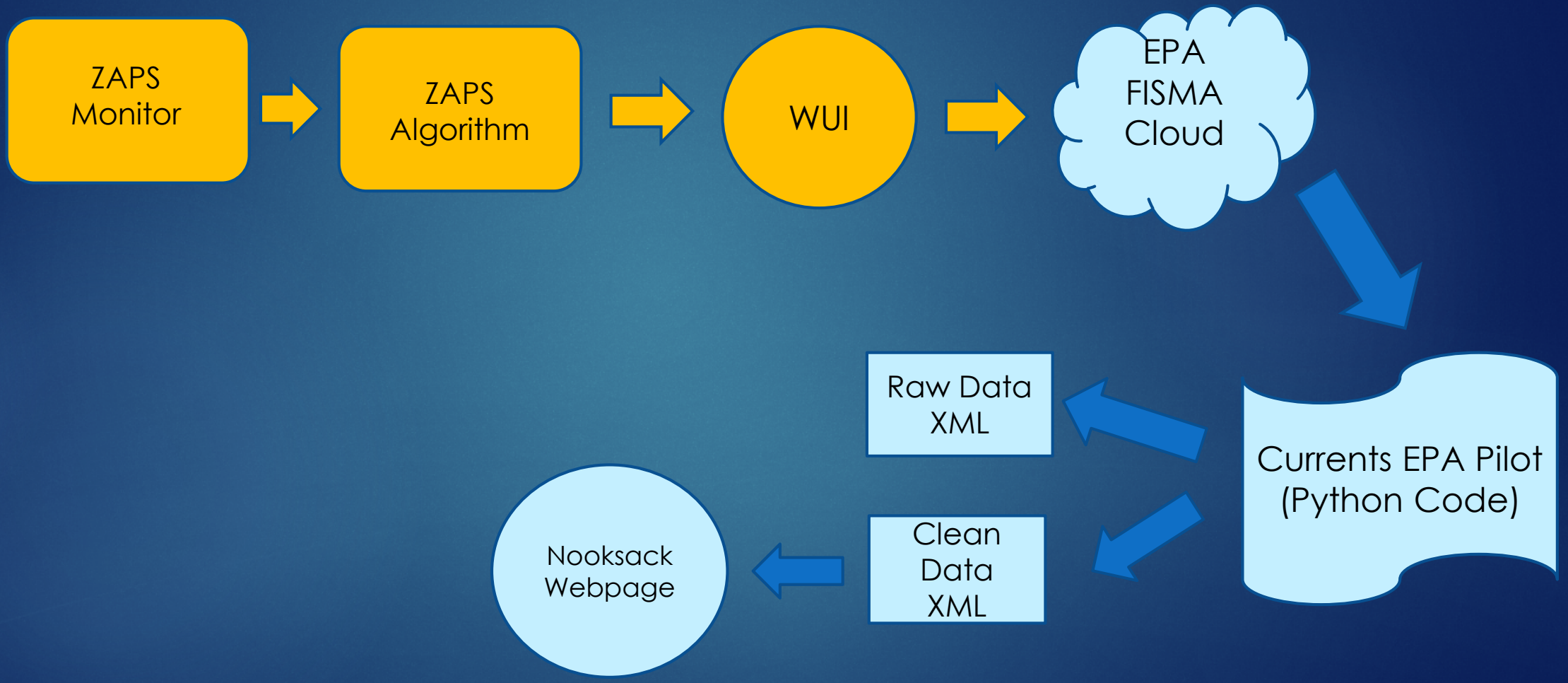
Overall Goal:

- EPA Region 10 would like to ensure the ZAPs continuous monitor data from the Nooksack watershed in Washington state is accessible to the partners and the public through the Currents interface.
- While this work is designed to support the water sensor deployment in the Nooksack Watershed, this effort will assist in the overall Agency efforts in managing water sensor data.

Project tasks:

- Improved sensor data registration and ingestion to system, including new QAQC implementation
- Improved Visualization on public interface *Currents,* including enhanced charting and download capability
- Deployment to Amazon Web Service OEI cloud
- Improved Workflow
- Development of Training Documentation

Data, Data, Data - Web



Web Page Information/Demo

- Region 10 Streaming Nooksack Page
  - https://wcms.epa.gov/user/login?destination=puget-sound/streaming-nooksack-pilot-project
- Currents
  - http://ec2-34-228-169-152.compute-1.amazonaws.com/CMDiscoveryTool/?zoom=48.92,-122.4947&org_id=USEPA&basemap=streetmap

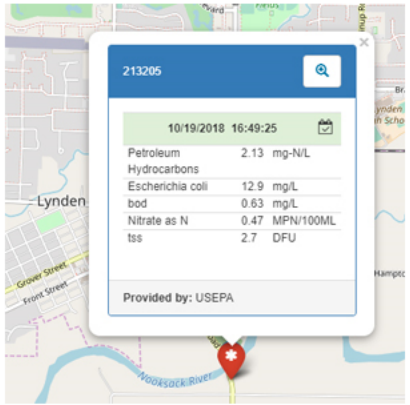
Puget Sound

Streaming Nooksack Pilot Project

The *Streaming Nooksack* pilot project is a collaboration between EPA, tribal, state, and local partners to install "near-real time" monitors that track a variety of important water quality measures in the Nooksack River watershed in Whatcom County, Washington.

View the Data

Explore Streaming Nooksack data using EPA's Currents Discovery Tool.



What is "near real-time? For this project, "near real-time" means that the sensor data is reported to the web about every 15 minutes. Due to the nature of complex data and various technological hurdles, it is not possible – nor necessary – to have minute-to-minute updates.

Learn more about the data.

About *Streaming Nooksack*

EPA and other federal, tribal, state, and local partners are working together to better understand trends in bacterial pollution, and to identify and reduce – or eliminate – pollution sources. These water quality improvement efforts are designed to:

- Protect public health.
- Further the goal of achieving year-round shellfish harvest approved by the Washington

Admin Info

About *Streaming Nooksack*

EPA and other federal, tribal, state, and local partners are working together to better understand trends in bacterial pollution, and to identify and reduce – or eliminate – pollution sources. These water quality improvement efforts are designed to:

- Protect public health.
- Further the goal of achieving year-round shellfish harvest approved by the Washington Department of Health in the marine waters of Portage Bay.
- Support the *Results Washington – Healthy Fish and Wildlife* effort led by the State of Washington.

The Streaming Nooksack pilot project is a collaborative partnership to deploy several "near real-time" monitors that report data on a variety of important water quality measures in the Nooksack watershed.

These monitors measure:

- *E. coli* (fecal coliform bacteria).
- Biochemical Oxygen Demand (BOD).
- Total Suspended Solids (TSS).
- Hydrocarbons.
- Chlorophyll-a (algae).
- Nutrients (nitrate/nitrite).

Water is pumped from the stream to the monitor station where it is analyzed and sent to the web about every 15 minutes.

Project partners have installed five stationary monitors in the Nooksack watershed through the three-year pilot project period (ending in 2019). A sixth mobile monitor is expected to be added in 2019.

We expect the continuous monitoring data will track the timing of changes in pollutant concentrations after rainfall or other significant events within the watershed.

This project will also explore the extent to which a near-real time data network can inform local decision-making.

Project Partners

- EPA

This project will also explore the extent to which a near-real time data network can inform local decision-making.

Project Partners

Admin Info

- EPA
- Lummi Nation
- Washington Department of Agriculture
- Washington Department of Ecology
- Washington Department of Health
- Washington Governor's Office
- Whatcom Conservation District
- Whatcom County Department of Public Works
- Whatcom County Public Utility District #1
- ZAPS Technologies, Inc.

How Will We Use the Data?

EPA and our partners are working to model water quality trends within the watershed based on precipitation, stream flow, and water quality measures. These trends can help us decide where to invest in pollution prevention efforts, focus on reducing stormwater runoff, and suggest timing for irrigation.

The data should also provide information about contamination flowing into the Nooksack River from tributaries, including waters from Canada.

What Happens After the Pilot?

In fall 2019, the project partners will assess the data and the technology and develop recommendations for how to use the information to inform future pollution prevention and water quality improvements.

The final report will also include an assessment of the effectiveness of real-time monitoring as a tool for protecting and improving water quality.

About the Data

Near-real time data is considered provisional data until it is more thoroughly reviewed. Data may be

The final report will also include an assessment of the effectiveness of real-time monitoring as a tool for protecting and improving water quality.

About the Data

Near-real time data is considered provisional data until it is more thoroughly reviewed. Data may be subject to significant change and are not citeable until reviewed and approved by EPA.

The data may be changed after review due to several reasons, including:

- Sensor not receiving flow.
- Sensor is off line for maintenance.
- Fouling has occurred in sensor.
- Malfunction of recording equipment.

Data are reviewed periodically to ensure accuracy. Each station record is considered provisional until the data are published.

Inside one of the water quality monitoring stations where data is transmitted in near-real time to the web.

Data users are cautioned to consider carefully the provisional nature of the information before using it for decisions that concern personal or public safety or the conduct of business that involves substantial monetary or operational consequences.

Information concerning the accuracy and appropriate uses of these data or concerning other data may be obtained by contacting ____@epa.gov.

Learn more about the technical specifications of the monitors at ZAPS Technologies. EXIT

Questions?

If you have questions or need help using the Currents Discovery Tool, contact EPA's Streaming Nooksack team at ____@epa.gov.

Top of Page

Contact Us to ask a question, provide feedback, or report a problem.

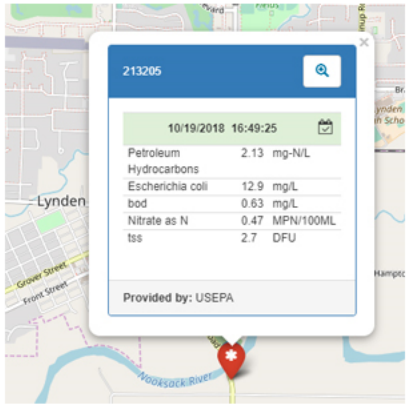
Puget Sound

Streaming Nooksack Pilot Project

The *Streaming Nooksack* pilot project is a collaboration between EPA, tribal, state, and local partners to install "near-real time" monitors that track a variety of important water quality measures in the Nooksack River watershed in Whatcom County, Washington.

View the Data

Explore Streaming Nooksack data using EPA's Currents Discovery Tool.



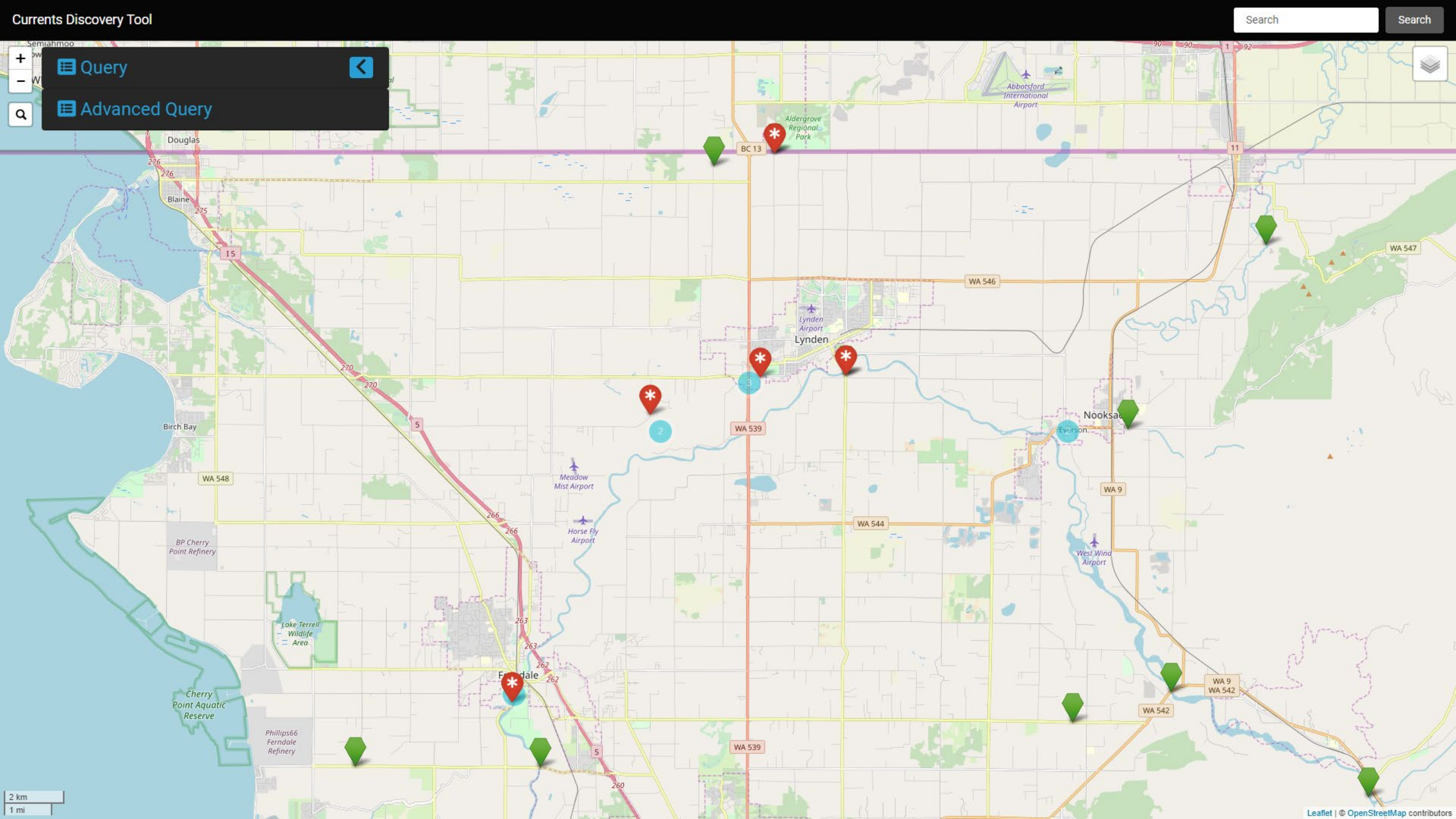
What is "near real-time? For this project, "near real-time" means that the sensor data is reported to the web about every 15 minutes. Due to the nature of complex data and various technological hurdles, it is not possible – nor necessary – to have minute-to-minute updates.

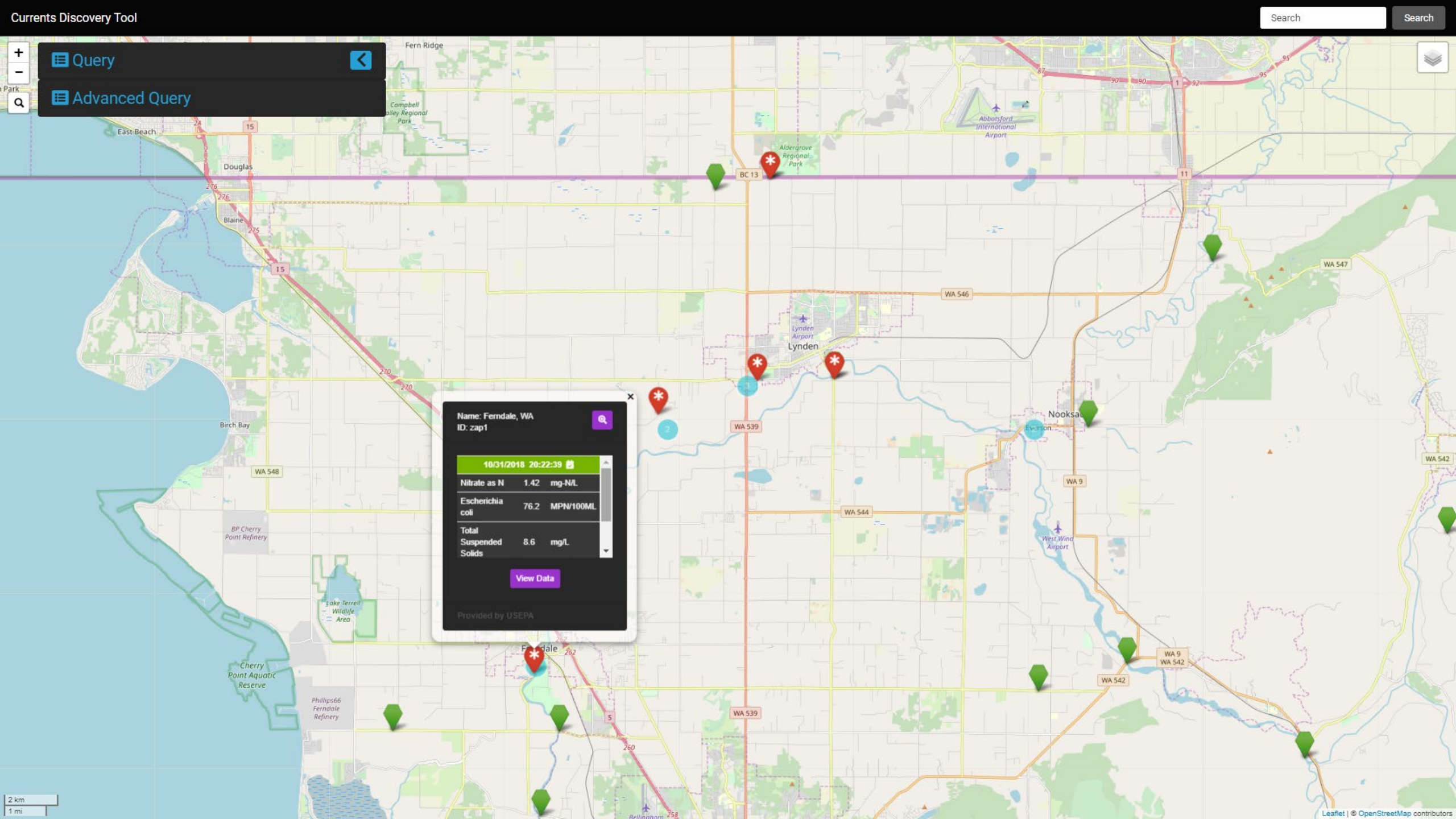
Learn more about the data.

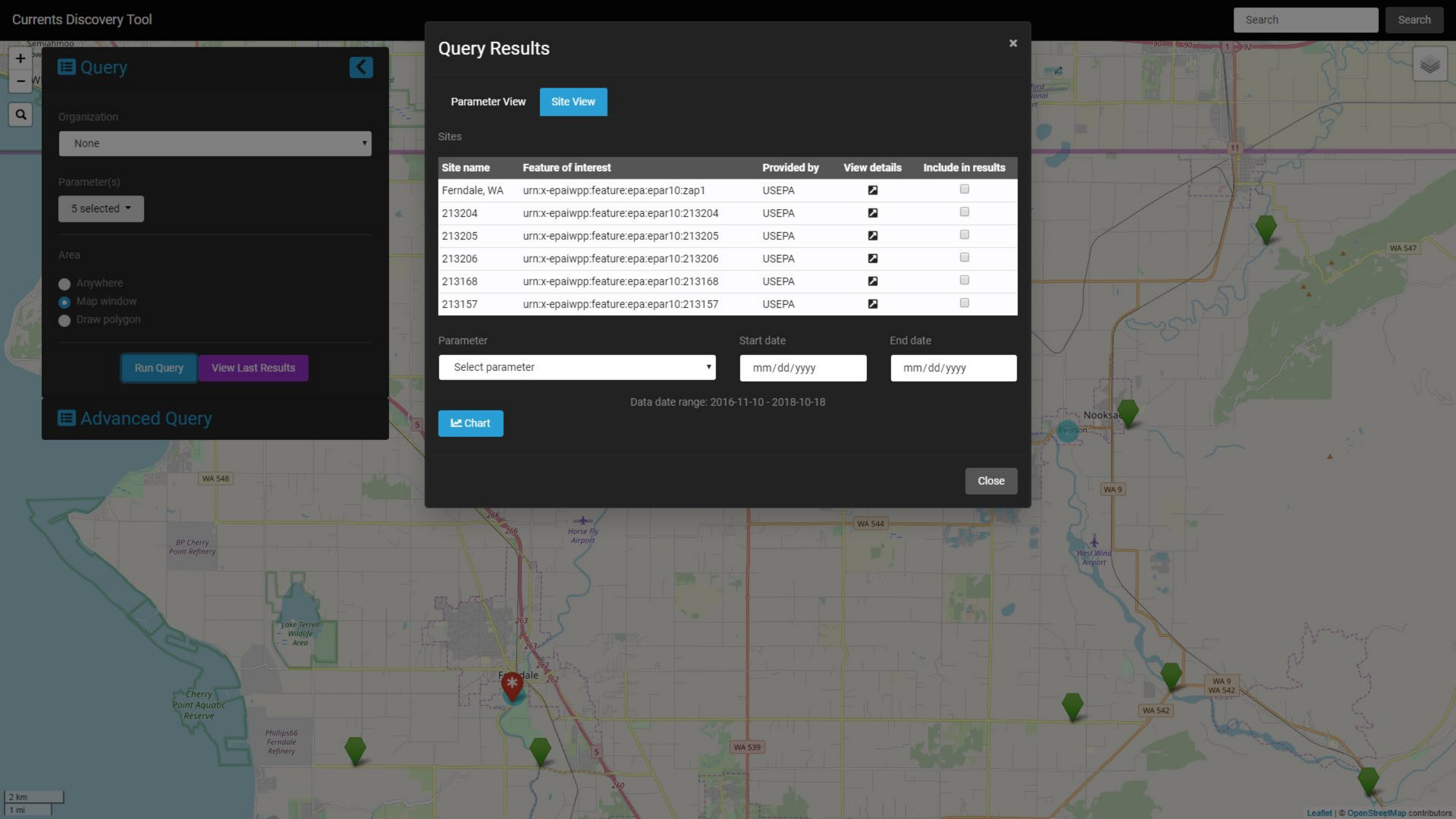
About *Streaming Nooksack*

EPA and other federal, tribal, state, and local partners are working together to better understand trends in bacterial pollution, and to identify and reduce – or eliminate – pollution sources. These water quality improvement efforts are designed to:

- Protect public health.
- Further the goal of achieving year-round shellfish harvest approved by the Washington


Currents Discovery Tool
Search
Search
Query
Advanced Query
Douglas
Blaine
Birch Bay
Lynden
Nooksack
Everson
Ferndale
Abbotsford International Airport
Aldergrove Regional Park
Lynden Airport
Meadow Mist Airport
Horse Fly Airport
West Wind Airport
BP Cherry Point Refinery
Lake Terrell Wildlife Area
Cherry Point Aquatic Reserve
Phillips66 Ferndale Refinery
BC 13
WA 546
WA 547
WA 539
WA 548
WA 544
WA 9
WA 542
WA 9 WA 542
2 km
1 mi
Leaflet | © OpenStreetMap contributors


Currents Discovery Tool
Search
Search
Query
Advanced Query
Name: Ferndale, WA
ID: zap1
10/31/2018 20:22:39
Nitrate as N 1.42 mg-N/L
Escherichia coli 76.2 MPN/100ML
Total Suspended Solids 8.6 mg/L
View Data
Provided by USEPA
Fern Ridge
East Beach
Douglas
Blaine
Birch Bay
Lynden
Nooksack
Ferndale
BC 13
WA 546
WA 539
WA 544
WA 548
WA 547
WA 542
WA 9
Abbotsford International Airport
Aldergrove Regional Park
Lynden Airport
West Wind Airport
BP Cherry Point Refinery
Cherry Point Aquatic Reserve
Phillips66 Ferndale Refinery
Lake Terrell Wildlife Area
2 km
1 mi
Leaflet | © OpenStreetMap contributors


Currents Discovery Tool
Search
Search
Query
Organization
None
Parameter(s)
5 selected
Area
Anywhere
Map window
Draw polygon
Run Query
View Last Results
Advanced Query
Query Results
Parameter View
Site View
Sites
Site name
Feature of interest
Provided by
View details
Include in results
Ferndale, WA
urn:x-epaiwpp:feature:epa:epar10:zap1
USEPA
213204
urn:x-epaiwpp:feature:epa:epar10:213204
USEPA
213205
urn:x-epaiwpp:feature:epa:epar10:213205
USEPA
213206
urn:x-epaiwpp:feature:epa:epar10:213206
USEPA
213168
urn:x-epaiwpp:feature:epa:epar10:213168
USEPA
213157
urn:x-epaiwpp:feature:epa:epar10:213157
USEPA
Parameter
Select parameter
Start date
mm/dd/yyyy
End date
mm/dd/yyyy
Data date range: 2016-11-10 - 2018-10-18
Chart
Close
Nooksack
Everson
Horse Fly Airport
West Wind Airport
BP Cherry Point Refinery
Lake Terrell Wildlife Area
Cherry Point Aquatic Reserve
Phillips66 Ferndale Refinery
WA 548
WA 544
WA 547
WA 9
WA 542
WA 539
2 km
1 mi
Leaflet | © OpenStreetMap contributors

Currents Discovery Tool

Search

Search

Query

Organization

None

Parameter(s)

Biochemical Oxygen Demand, Escherichia coli, Total Suspended Solids

Area

Anywhere

Map window

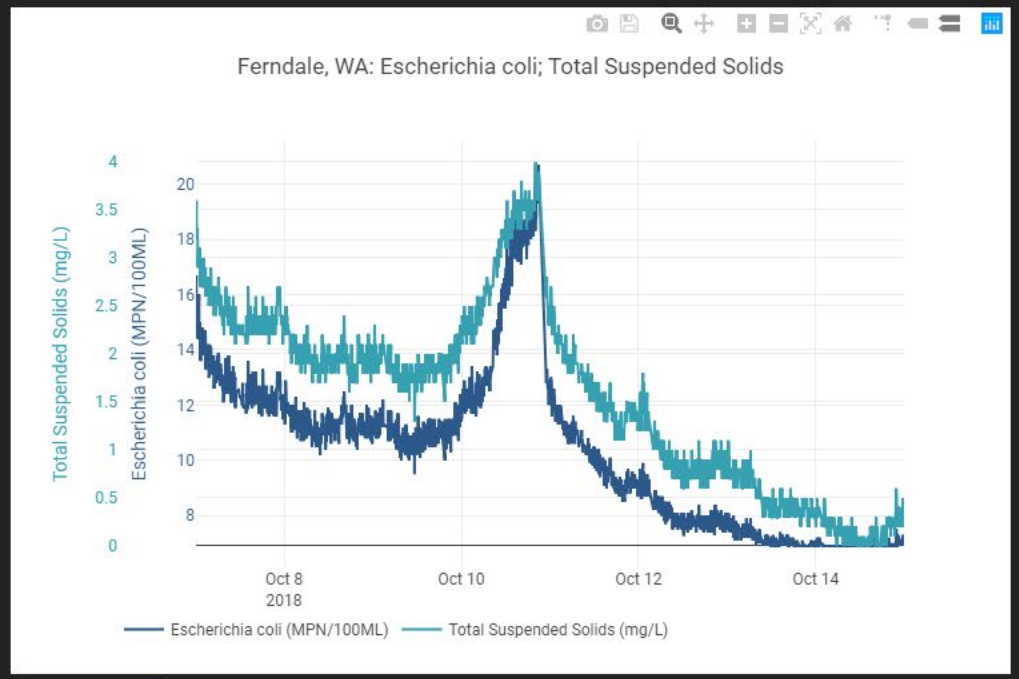
Draw polygon

Run Query

View Last Results

Advanced Query

Chart Results



Download

Close

Leaflet | © OpenStreetMap contributors

Currents Discovery Tool

Search

Search

Query

Organization

None

Parameter(s)

Biochemical Oxygen Demand, Escherichia coli, Total Suspended Solids

Area

Anywhere

Map window

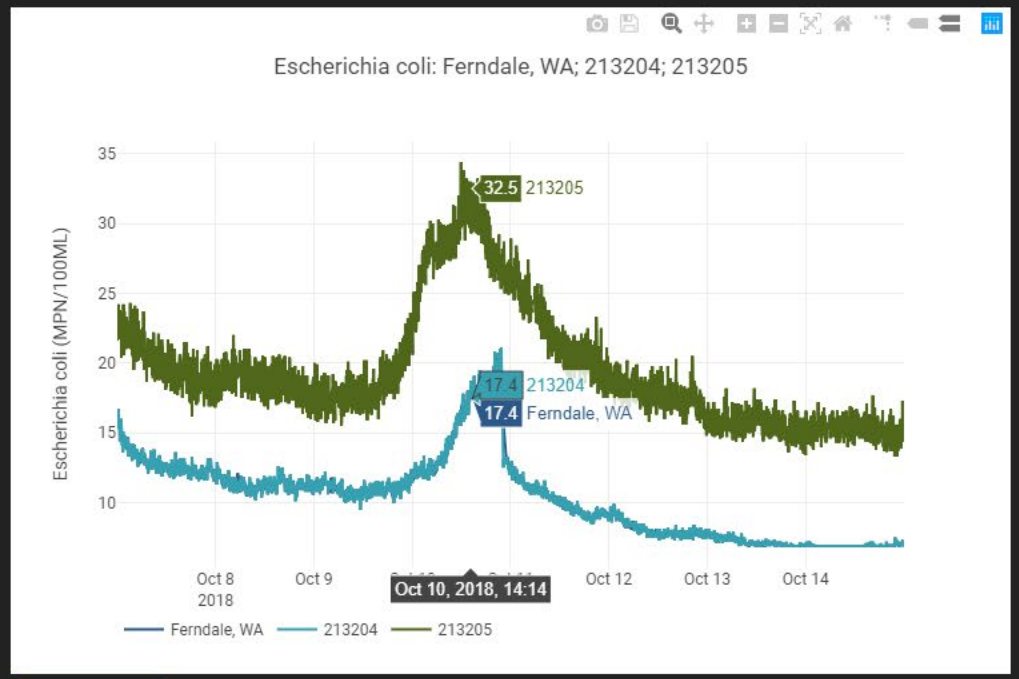
Draw polygon

Run Query

View Last Results

Advanced Query

Chart Results



Download

Close

Leaflet | © OpenStreetMap contributors

Outreach Strategy

- See Handout
  - **Goal**
    - Positive coverage of the Streaming Nooksack/ZAPS tool and EPA's role
  - **Objectives**
    - Support from partners (including tribes, Washington State Dairy Federation, concerned locals)
    - Demonstrate the application of this technology in an agricultural setting
  - **Strategies**
    - Early outreach and demo to partner
    - Discussion & demonstration
  - **Tactics**
  - **Audiences**

Outreach Strategy

- **Messages**
  - This is a collaboration intended to improve understanding of the relationship between weather and pollution detected in the river.
  - The project is an important piece of the federal and state commitments to re-open shellfish tribal (and non-tribal commercial?) beds.
  - Data can be used to inform decision-making and investments, eg irrigation timing, funding of voluntary projects, etc
  - Data will not be used to conduct enforcement
  - We're piloting this technology with many others
  - After three-year pilot is over, EPA and the project partners will determine what worked, what we all liked, what didn't work and how (and whether) we would establish a permanent network of monitors.
  - EPA is conducting this work separate and apart from its work funding and providing oversight for the Puget Sound recovery efforts it funds through the NEP.

Streaming Nooksack – Sensor Network Implementation Timeline